

Power Needs and *Wind Power* as Different as Day and Night

Brian Vick found that, in parts of Texas and California, an almost perfect match between wind-power production and peak energy demands can be obtained by combining wind power with solar power, and by proper storage of excess energy when power supply exceeds demand.

Vick is an agricultural engineer at the Agricultural Research Service's Renewable Energy and Manure Management Research Unit in Bushland, Texas.

Vick found that in both the Texas Panhandle and California, there is almost an exact mismatch between wind-power production and peak energy demands over a 24-hour period. In these locations, at the tops of modern wind turbines, winds are lowest at midday, when power demands are greatest. In Texas, there is a seasonal mismatch as well: The winds are weakest in the summer, when power demands peak. But adding solar power helps because the sun's rays are most intense at midday and in summer months.



Wind turbines for electricity production.

When wind or sun power generated exceeds demand, it's important to capture the energy and store it. The most efficient storage system is one being used in solar thermal power plants, where the sun's energy is used to heat water or other fluids. The fluids are kept hot long after the sun goes down and can be used later to produce steam to generate electricity. The excess electricity generated

by wind in the late night and early morning hours could be pumped into the grid and stored to supply power when wind and solar power are insufficient.

Vick and colleagues at Bushland design and test wind/solar/biodiesel hybrid systems running on an experimental electric grid. They also operate modern turbines for wind-farm research for the U.S. Department of Energy.

Vick expects that a better blending of solar and wind power will increase the use of renewable energy for California, Texas, and the rest of the nation. Texas is the top state for wind-generated electricity production, with Iowa second and California third. California is the leader in solar-generated electricity production.—By **Don Comis**, ARS.

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Torching Invasive Trees Revives Rangeland Perennials

Western juniper trees have thrived in Oregon's high desert for about 6,000 years, but in the past century, the aggressive conifer has begun to dominate some of the region's sagebrush grasslands. In Burns, Oregon, Agricultural Research Service rangeland scientists Jon Bates and Tony Svejcar are finding ways to manage this arboreal invasion and prompt the recovery of perennial grasses and forbs.

Although rangeland managers use controlled burns to keep ahead of the juniper, they also just cut down the problem trees and leave them where they fall. This protects the soil, but the dead trees pose an increased fire risk—and may also create conditions that encourage establishment of cheatgrass, an invasive annual that fuels fierce wildfires.

Bates and Svejcar conducted a study at a site dominated by a 90-year-old

western juniper woodland—a site once vegetated with basin big sagebrush and associated perennial grasses and forbs—to determine whether burning the cut junipers would help reestablish the perennials. Burning was done during two consecutive winters after cutting. A control group of felled trees at the site was left unburned.

Results indicate that burning the trees when soils were frozen prompted a more successful recovery of perennials and helped keep cheatgrass establishment at bay. Ten years after burning, total perennial grass cover was 1.5 to 2 times greater in the areas where trees had been burned than in the areas where they were not burned. Perennial grass density was 60 percent greater in the burned areas than in the unburned areas, and cheatgrass was twice as dense in the control area as in the two burned areas.

The scientists concluded that native

perennial communities could recover from juniper invasions most effectively when the felled junipers were burned rather than cut and left. Burning in winter, when soils were wet or frozen, helped limit damage to existing perennials at the site and gave them a head start in their growth the following spring, when they needed an edge against invasive annuals.—By **Ann Perry**, ARS.

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